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Tank Crossings Under Water in Winter

by

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From 16 to 19 February 1960 we carried out a tactical exercise with the 188th Guards Tank Regiment of the 42nd Guards Tank Division with a view to determining the most advisable procedure for preparing tanks for crossing a river under water in winter; and also with a view to finding methods of reconnoitering and preparing underwater routes and of organizing the evacuation and rescue service (evakospasatelnaya sluzhba).

The preparations for the exercise began in the regiment with the selection of crews. Only personnel accepted by a medical commission as fit for driving tanks under water were included in the line and training companies of medium tanks.

Serious difficulties arose in connection with the preparation of the IP-46 insulated gas masks. As is known, the IPVT-58 instructions for surmounting water obstacles by underwater tank crossings forbid the training of tank crews for operations under water in insulated gas-masks when the temperature of the water is lower than plus 15°, as under such conditions the regenerating cartridge reacts very slowly and does not ensure an adequate flow of oxygen.

A solution to this problem had to be found. A series of experiments carried out by a department of the chief of chemical troops of the army gave positive results. Colonel Golovyashkin invented a warming cuff (uteplitelnyy manzhet) for the regenerating cartridge which ensures that the insulated gas mask works properly when the temperature of the water is plus 2° and higher. The warming cuff can be described as a layer of felt 0.5 cm in thickness superimposed on the case of the regenerating cartridge. On top of the cuff a rubber (rubberized) cap (kolpak) is installed.

The training of crews in the use of insulated gas masks under water was carried out in a water tank (plavatelnyy basseyn), while methods of evacuating crews from a tank which had stopped were worked out in a training tank (tank-trenazher) specially prepared for flooding.

Before the beginning of the exercises, practical work in making the tanks airtight and water tight (po germetizatsii zamochke tankov) was carried out; a stretch of river was prepared; all crews were put through the 18th exercise of the "Tank Driving Course (KVT-59)" with escape tube (truba-laz) and snorkel (vozdukhopit-ayushchaya truba). Tactical-drill and tactical exercises with subunits and also command-staff exercises, were conducted. A number of measures for the Party-political support of the exercise were implemented.

It was decided to conduct the practical exercises in the forcing of water obstacles by tanks along the bottom of a river in winter on the Samara River. At the selected sector, the width of the river was 100 to 150 meters, and the depth 3.7 to 4.9 meters. The thickness of the ice at the time of the exercises was 30 to 40 cm.

It was well known to us from experience gained in exercises that the reconnoitering of probable spots for crossings in winter, the making of channels (mayna) in the ice and clearing them of ice is very laborious and demands a great deal of time. It is undesirable to hold up a tank regiment at a water obstacle for a long time, as this will lead to lowering the tempo of advance.

Before reaching the water obstacle, the commander of the regiment was already faced with the task of organizing thorough reconnaissance of the river and of preparing all his forces and resources for forcing it. It was necessary to determine in advance the width, depth, and speed of the current of the river, the thickness of the ice, and the nature of the bottom; also to fix the spots where the tanks would enter and leave the river, and suitable areas for hermetically sealing (germetizatsiya) the tanks, and also to make suitable arrangements for the deployment of the evacuation-rescue service.

In order to speed up reconnaissance of the river a special engineer-reconnaissance group, consisting of 10 combat engineers in a K-61 radio vehicle (radiynaya mashina), was allocated to each probable route (trassa). Each group was supplied with reconnaissance equipment (binoculars, measuring rod, minedetector, probes, etc) and explosives.

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When the opposite bank of the river had been taken by the

reconnaissance and motorized-rifle subunits, the engineer-reconnaissance groups moved forward to the river and, having determined from its external characteristics the axis of the route to be used, started to reconnoiter it.

In order to measure the depth and make up a profile map of the river, holes are cut in the ice. By working by hand with a crow-bar and an axe, one man can make a hole in ice 30 cm thick in 3 minutes. And an engineer-reconnaissance group of 10 persons on the route can make up the profile map of a river 100 to 120 meters wide in 25 to 30 minutes. A way of making holes with explosives which was tested by us reduces the time necessary to reconnoiter the river by 1½ to 2 times. Using this method it takes the engineer-reconnaissance party 4 to 6 minutes to lay out on the ice a previously prepared electric circuit for the explosives (elektrovzryvnaya tsep), main leads (magistralnyy provod), and 4,000 gram explosive (VV) charges, to insert the electric detonators, and to effect the explosion. For measuring the depth and filling out the blank profile map of the river, 4 to 6 minutes are also required.

After the reconnaissance, engineer subunits moved up to the routes and began to make channels. Preliminarily, the ice was broken up by the explosive method.

After the ice is blown up, by making it pack downstream, a strip is created which is free of ice. The width of this strip depends on the current of the river and the dimensions of the channel which has been blown open. Consequently the bigger the area of the ice which is blown up and the stronger the current of the river, the greater the strip free of blocks of ice will be. It can be used immediately for a tank crossing.

For blowing up the ice we formed a team of 30 persons. It was provided with crow-bars, measuring rods, 320 kg of explosives in charges (shashka), 320 electric detonators, 2,300 meters of electric wiring for the explosives in sections (uchastkovaya elektrovzryvnaya set), 3 detonating machines, 1,800 meters of main leads and 320 pegs on which to hang the explosive charges.

In the prepared holes, charges weighing 1 kg were hung from pegs at a depth of 1.2 meters in rows of three groups. The distance between the charges and rows was 5 meters; between the groups, 10 meters.

Preparations for blowing up the ice in one channel took 90 minutes. In our opinion, this time could be reduced considerably by training the personnel and organizing the work better.

Before the tanks started to cross, a route 80 to 100 meters wide was cleared of ice and checked by divers and by river reconnaissance equipment (apparat razvedki reki) AR-2. In addition, an adapted device of the "harrow" type swept (protralivat) the bottom of the river and removed charges which had not exploded (experience showed that there were up to 10 per cent of these).

For clearing the channel of ice for an area of 105 by 6 meters, the team which had prepared the blast and armored prime movers (bronetyagach) of the evacuation and rescue service were enlisted. Altogether up to 1,900 cubic meters of ice were removed. For this purpose a strong angled scraper (volokusha-ugolnik) was constructed with a span of 7 meters and an adjustable height of 0.8 to 1.6 meters. The scraper was towed by two armored prime movers situated on both banks of the river. Every time it was put into the stream for 4 minutes, 12 to 15 cubic meters of ice were hauled on to the shore. From the shore, the ice was cleared by bulldozers. Other ways were tried, but proved less effective. In particular, the use of metal chains and pushing through the ice and packing it with the wash created by the propellers of several K-61 vehicles and of a water jet unit (vodometnyy dvizhitel) MTB-50P, did not produce satisfactory results, merely making the time required for clearing a channel longer.

It took about 6 hours to clear the channel, which cannot be regarded as satisfactory. However, even after this, some blocks of ice remained, threatening the safety of the tanks moving on the route.

Thus, the exercise showed that the question of preparing channels for the passage of tanks under water has not been finally solved.

Even when the work is properly organized and the necessary materiel support is available (4 armored prime movers with 2 scrapers, 2 or 3 K-61 transporters with wooden sweeps hung in front, etc) a route 100 to 150 meters in length can be prepared in 2½ to 3 hours. At the same time, only 60 to 75 minutes are required for hermetically sealing tanks.

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It is necessary to go on looking for the most efficient ways of clearing channels. For instance, we carried out tests on a river

105 to 112 meters wide. What if the width of a river were to be 300 to 600 meters and more?

We also tested the OPVT-54 [probably 1954 tank underwater crossing equipment.] on T-55 tanks. At tactical exercises in the summer of 1959, this equipment functioned without a hitch; 72 tanks of the 188th Guards Tank Regiment successfully forced the Dnepr River where it is 630 meters wide and did not have any forced stops.

During winter exercises, the external parts of the OPVT revealed some weaknesses. For instance, in the case of one tank a piece of ice which became dislodged from the edge knocked off the snorkel. This happened when the tank was 15 to 18 meters from the bank, after which the tank continued to move for 5 to 7 seconds under water without the snorkel and got ashore safely.

But more serious incidents may occur when tanks cross under water in winter. It is, therefore, very necessary to modernize the external parts of the OPVT. We suggest that the snorkel should be strengthened and fixed more firmly, that the mask (maska) and the packing of the muzzle face of the gun should be protected, that the OPVT outfit should include a float, which in the event of necessity would show the whereabouts of a submerged tank whose snorkel had been knocked off. The OPVT should be modernized in such a way that a tank can move safely in a channel with pieces of ice in it. A solution of this question would enable the time required for preparing a route for the passage of tanks under water to be cut down considerably.

Low temperatures greatly increase the time required for hermetically sealing tanks. If this can be done in summer in 30 to 40 minutes, then 60 to 70 minutes are required in winter This is due in the first place to the greater time needed for filling the cracks with ZZK-2 sealing compound; when it is not warm enough, the sealer lacks elasticity, and when warmed up too much, it runs. Moreover, when it is very cold, the crews find it harder to work, for if they do not wear mittens, their hands freeze rapidly. Consequently, some new kind of sealer must be devised, a kind that would be more suitable for use in low temperatures.

Experience gained in organizing an evacuation and rescue service in winter has served to confirm the views on this question which have been developed in the last few years. However, there are certain peculiarities which must be taken into account. For

instance, in narrow channels the work of rescue teams and riggers (takelazhnik) becomes limited owing to the fact that there is not enough room for moving floating gear (plavsredstvo) about. Rescue groups must be fitted out with heavy diving equipment, as light diving equipment is unsuitable for use by divers in winter even for a short time.

Measures must be taken in good time to improve the grip of the caterpillar tracks of tanks on the icy slopes leading down to the river, and especially when climbing out of the water (making the slopes less steep, hacking the ice away, spreading sand, etc).

Finally, it is necessary to prepare places where the crews can be warmed, and to fit such places out with supplies of clothing and footwear for men who have been forced to go into the water.

In conclusion, we would add that tank crossings under water in winter are quite feasible. What should be done is to collate the experience gained during the series of exercises, and also to modernize the equipment for the travel of tanks under water.

Colonel A. Panevin.

Exercises in forcing large water obstacles carried out in the last few years in the Kiev Military District have demonstrated convincingly that the troops have learned how to cross a river from the march in summer without any serious pause in the impetus of the advance. Tank crossings under water have been used extensively in forcing rivers. As a rule, hermetically sealing tanks is done at a distance of 5 to 7 km from the river bank, while at the actual river the machines do not stop for more than 2 or 3 minutes. These results have been achieved thanks to improvement of the OPVT outfit and constant study of the experience gained in forcing water obstacles.

But what is to be done if it is essential to force a river in winter when it is icebound?

If the ice is thick enough, the forcing of a river does not present many difficulties. As is known, for the surface crossing of medium tanks, the thickness of the ice must be not less than 60 cm, while the temperature of the air outside must be below the freezing point.

However, on the rivers of the Central-European theater of military operations the ice seldom reaches a thickness of 30 to 40 cm. The strengthening of such ice by further freezing or other means so that tanks could cross it is impossible in practice; much time would be required, and in battle the enemy would prevent this being done. The problem has arisen of forcing rivers in winter by tank crossings under water.

In the winter training period of 1959/60, exercises were carried out by us in forcing such rivers as the Dnepr, Desna, and Samara. In forcing the rivers, our tanks equipped with OPVT outfits crossed under water, surmounting water obstacles up to 5 meters in depth and 200 to 250 meters in width. The obstacle was forced after the ice in the river had been blown up. The tanks crossed under water along channels, cleared of ice, 40 to 60 meters in width.

Tank crossings under water in winter are accompanied by a number of difficulties. Apart from blowing up the ice and clearing the channel the tanks require additional fitting out.

The training of crews in driving tanks under water in winter conditions also has its special aspects. The first is that the training of crews in the use of IP-46 insulated gas masks under water in the

event of the tank being flooded must be carried out in a heated water tank. Specially equipped classrooms are also necessary. In the 300th Tank Regiment, three classrooms were fitted out for training crews. One was intended for lessons about the structure and rules for using the IP-46 insulated gas mask. In the second classroom, training was carried out in escape from a flooded training tank (tank-trenazher). The body (korpus) of an obsolete T-34-76 tank was used as a training tank. Special gear was set up for flooding the tank and pumping out water. For flooding the training tank, use was made of two VS-65A centrifugal pumps with a capacity of 48 m^3/hour. It took 6 or 7 minutes to flood the tank with water. Water which entered the trainer was chlorinated and filtered. The third training classroom was devoted to fitting out and warming the crews after they had escaped from the flooded training tank.

After the tank crews had familiarized themselves thoroughly with the rules of using the insulated gas mask inside the flooded training tank and during the escape from it, practical training was carried out in the regiment in driving a tank with an escape tube through a deep ford.

Let us go into greater detail about the special features of preparing tanks for being driven under water in winter conditions and about the peculiarities of the actual driving.

The preparation of a tank for movement under water consists in attaching the fixed part of the OPVT outfit (on vehicles produced before 1958) and in mounting its detachable part. In winter, the time required for carrying out all the work involved in preparing a tank increases considerably. For fitting the fixed part of the OPVT in winter, 100 to 120 manhours are required, whereas in summer this can be done in 80 to 90 manhours. The time required for hermetically sealing vehicles also becomes greater. When the temperature of the air is below minus 10°, the crews on an average take 1½ hours to mount the detachable part of the OPVT outfit and to fill the cracks in the tank. The ZZK sealer thickens considerably and has to be warmed before use. The rubberized fabric of the detachable equipment becomes stiff and warps. For instance, when the temperature of the air is minus 18°C and lower, three men have difficulty in fitting the packing on the ventilator. In summer, this operation can be carried out quickly and easily by two persons.

When it is freezing, it is much more difficult to bore holes in armor. Drills and taps often break. All this leads to an unnecessary expenditure of time.

Quite a number of specific things of a preparatory nature are done. For instance, the asbestos packing of the exhaust pipe must be moistened with some cooling fluid that does not freeze, and not with water, as is done in the summer. In winter it is not necessary to adjust the steam and air valve for higher surplus pressure; cases of overheating of the fluid in cooling systems have not come up. The working of the water-pumping system is being carefully tested with a view to avoiding freezing of the impellers of the pump (krylchatka pompy).

At the same time, in winter it is not necessary to seal the tanks hermetically in two stages. Experience shows that even when the departure area is a considerable distance from the river, all the work of hermetically sealing tanks can be carried out in this area, while all that has to be done at the river edge is to close the lid of the hatch for sealing the engine compartment. The time the tanks remain at the water obstacle itself is thus greatly reduced.

Tanks moving under water must be directed by radio only. If radio contact ceases, the driver must stop the tank at once. If this is not done, then when the tank approaches the edge of the ice the snorkel can be knocked off by striking the ice. The gyro compass (giropolukompas) does not fully ensure the safety of a tank's movements under water in a narrow channel.

Only one tank is permitted to be under water at a time. When two or more tanks are moving there at one time rapid evacuation of vehicles which have stopped becomes difficult.

The channel is made as wide as possible. When the width of the river is 200 to 250 meters, it must be not less than 40 meters wide.

The work of preparing channels is very laborious. The clearing of ice from the passage which has been blown up takes an especially long time. The blocks of ice that remain can damage the packing, knock off the snorkel or the antenna, and sever the ropes to which the towlines are tied. If blocks of ice of about 0.9 by 0.5 meters and 20 to 30 cm in thickness strike the snorkel they will knock it off. Consequently, the channel must be watched closely all the time.

The forcing of rivers by tank crossings under water along a cleared channel calls for much laborious preparatory work which it

is almost impossible to carry out under enemy fire. In our exercises another method was tested. It consists of blowing up the ice as the tanks reach a particular sector of the river. The tanks force the river under the broken ice without a channel being cleared. Such a method makes the forcing of a river possible at any place where the depth of water and the nature of the bottom and of the banks allow it. However, this method necessitates the mounting of additional equipment on the tank for the protection of the OPVT outfit from possible damage by broken ice. In the first place, damage can be done to the snorkel, the packing on the gun mask, and the cover for the turret ventilator.

The innovators of the 300th Tank Regiment recommended and successfully used protective devices for the OPVT outfit at the exercises. Diagram 1 shows a T-54 tank on which a protective device for the OPVT has been mounted, while Diagram 2 shows a tank with a protective device at the moment of leaving the water. Diagrams 3 and 4 show the detailed structure of the protective devices for the snorkel, the packing of the gun mask, and of the cover of the ventilator.

The structure of the protective device is not at all complicated. If well adjusted, it can be put in position by a tank crew in 2 to 2½ minutes. The device can be removed in 1 to 1½ minutes.

A weakness of the device which was used must also be mentioned. It prevents a tank from opening aimed fire as soon as it reaches the opposite bank. It is necessary to stop for a short time and remove the device. Moreover, the recommended device does not protect the antenna. When a tank is moving under broken ice, it is essential to raise the antenna through the snorkel or through the escape tube, as was done at our exercises.

As soon as a tank leaves the water, its viewing devices freeze over and it becomes impossible to see through them. The driver is forced to stop the tank on the opposite bank, get out, and clean the viewing devices. In order to avoid undesirable stops by a tank, the following method of treating the driver's observation devices can be recommended. When the tank is in the area for hermetically sealing, one viewing device of a T-54 tank is fixed in a lowered position and its lid (kryshka) is smeared with grease (solidol). In such a case the driver will use only one device for observing the way en route from the area for hermetically sealing to the river. After the tank reaches the opposite bank, the driver raises

the protected viewing device to the raised position and looks through it. In T-55 tanks the driver cleans the viewing device with spirits with the aid of special equipment.

The unsealing (razgermetizatsiya) of the tank is done as soon as it leaves the water. The longer this is delayed, the harder the packing will freeze to the tank and the more difficult it will be to remove it. More time and effort will be required to accomplish this. For the partial unsealing of a tank in winter, 10 to 15 minutes are required, and for complete unsealing, 20 to 25 minutes.

When tanks come onto the opposite bank, soil at the edge of the water is churned up (navolakivayetsya grunt). So after 6 to 10 tanks have moved out at the same spot, large ruts (valik) form which are difficult to overcome. In order to safeguard the movement of the vehicles, the shore is cut away or blasted out from time to time. At the moment when the tanks are leaving the water, orders for turning movements must not be given. This can lead to skidding and to the tank slipping back.

We will dwell briefly on peculiarities involved in the organization of rescue and evacuation service (spasatelno-evakuatsionnaya sluzhba) in winter conditions. In our case, rescue and evacuation groups were organized separately at each tank crossing point. In winter the forces and resources of the rescue and evacuation service have to be strengthened because of the necessity of more quickly evacuating a tank which has stopped under water.

The composition of the rescue and evacuation groups was pracically the same as in summer. However, the rescue group, to cover the crossing of tanks under water along a channel not cleared of ice must be further strengthened by 5 or 6 combat engineers and must have 4 or 5 wooden shields 0.5 by 2 meters in size, which are needed for approaching a tank which has been forced to stop under water. In addition, rescue and evacuation groups are provided with metal scoops for shoveling ice.

The low temperature of the surrounding air makes the work of the rescue and evacuation groups considerably more difficult, therefore, the equipping of such parties becomes a matter of importance. Personnel must be clothed in quilted jackets and provided with lifejackets, felt boots, and warm mittens.

In winter it is expedient to provide a rescue group with two DL-10 flat-bottomed boats (polulodka) with outboard motors. In a

narrow channel, it is difficult for a launch (kater) to maneuver and to reach a tank which has stopped in the water. We also consider that it is absolutely necessary to include heavy divers (tyazhelyy vodolaz) in the composition of a rescue group. Light diving equipment is not always adequate for the work of divers under water in winter. Floating rescue equipment must be protected with wooden shields, in order to preclude its being pierced by the ice.

In winter, the grip of the caterpillar tracks on the ground is considerably reduced. For this reason, we fitted grousers (gruntozatsepa) on all prime movers. The rear side plates (zadniy podkrylok) were first removed.

In order to ensure the safety of the crew of a tank moving under broken ice, we attached a cable, the length of which was 50 to 70 meters greater than the width of the river. After forcing the river, the crew detaches the cable from the tank and the evacuation group deployed on the opposite shore hauls it back again with a prime mover. The tanks cross in this way, one after the other. The addition of an "insurance" cable ensures the rapid evacuation of the tank in the event of a forced stop. The means of the evacuation group are on the shore in full readiness to evacuate tanks from the river. At the same time, the motors of all armored prime movers and transporters are kept warm.

While the forcing of the river is in progress, the rescue group is in a boat at the edge of the ice in the middle of the fairway (farvater) of the river downstream.

Guards Engineer-Colonel N. Oleynikov

Engineer-Lieut. Colonel A. Morozov

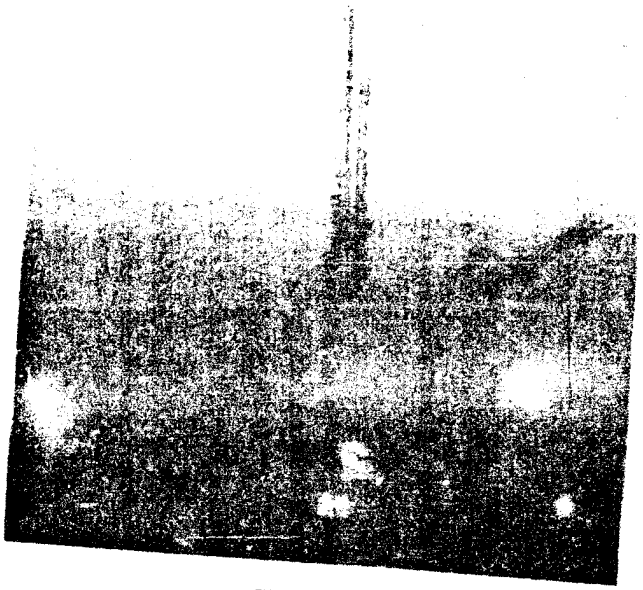

Diagram 1. T-54 tank with protective device fitted

Diagram 2. T-54 tank with protective device at moment of leaving water

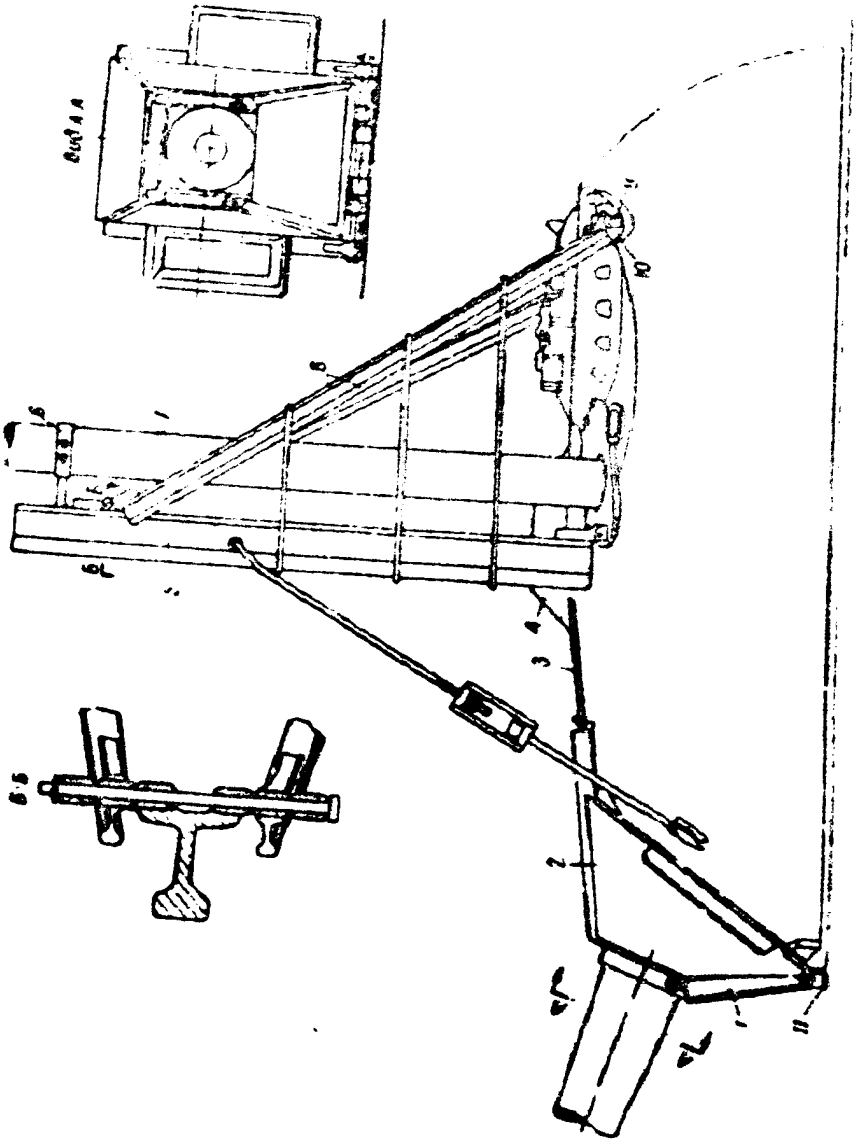

Diagram 3. Device for protecting the snorkel and the packing of the mask and the ventilator cover

1. Hinged flap (stvorka otkidnaya)
2. Housing for protection of the the mask (kozhukh zashchity maski)
3. Connecting strip (planka soyedinitelnaya)
4. Housing for protection of the ventilator cover
5. Type III-A rail (relc tipa III-A)
6. Bracket
7. Snorkel
8. Brace rails
9. [Work blurred]
10. Brace of [word blurred - same word as 9]
11. Bolt

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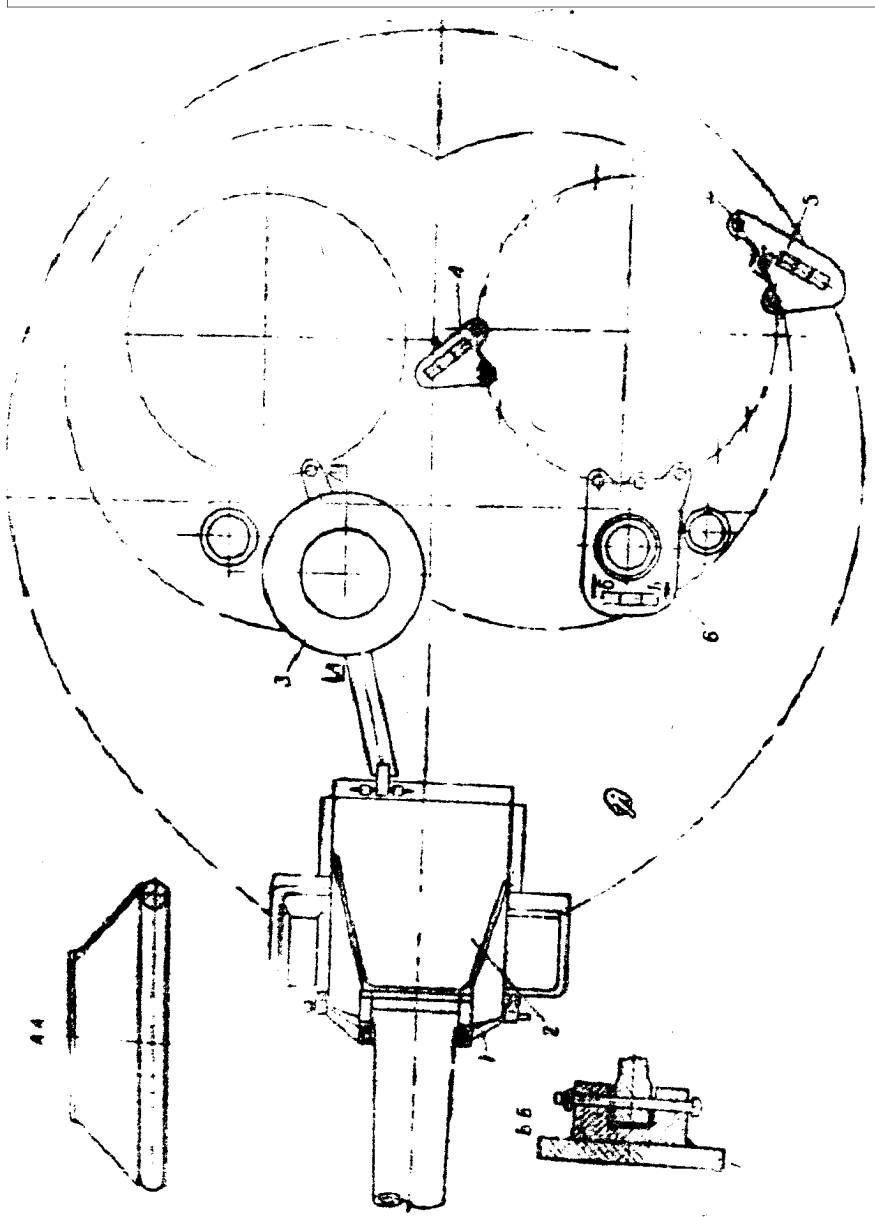

Diagram 4. Device for protecting the snorkel and the packing of the mask and ventilator cover

1. Hinged flap
2. Housing for protection of the mask
3. Housing for protection of the ventilator cover
4. Righthand brace bracket (kronshteyn pravoy opory)
5. Lefthand brace bracket
6. Bracket for fastening the protective device